



Origins of Life

Panspermia

<http://library.thinkquest.org/C003763/index.php?page=origin08>

Image courtesy Jesse Lefkowitz

A glowing meteoroid crashes into the barren surface of Earth with thunderous impact. Dust and debris spew up into the atmosphere, shrouding the planet in darkness. Hundreds of years later, the dust finally settles. But things have changed. Microbes, which had lain dormant in the meteoroid were revitalized when the conditions became appropriate and then spread across the planet. Instead of being destitute of life, the Earth now teems with microscopic organisms. The planet was seeded by the cosmos.

This is a fictional (although possible) scenario for how life could have started on Earth. A theory called panspermia states that the Earth was "seeded" with life when celestial objects collided with the Earth. The term panspermia is

Greek for 'seeds everywhere'. While the idea of life on Earth having originated elsewhere in the galaxy had been discussed by ancient Greek philosophers, the modern theory of panspermia did not gain much approval until the late twentieth century.

At this time, astronomers Fred Hoyle and Chandra Wickramasinghe found traces of organic compounds in the interstellar medium by analyzing the light from distant stars. This evidence supported the theory that comets (composed primarily of water and ice) and other celestial objects could carry bacterial spores across galaxies.

The theory of panspermia gained even more support with the announcement during the



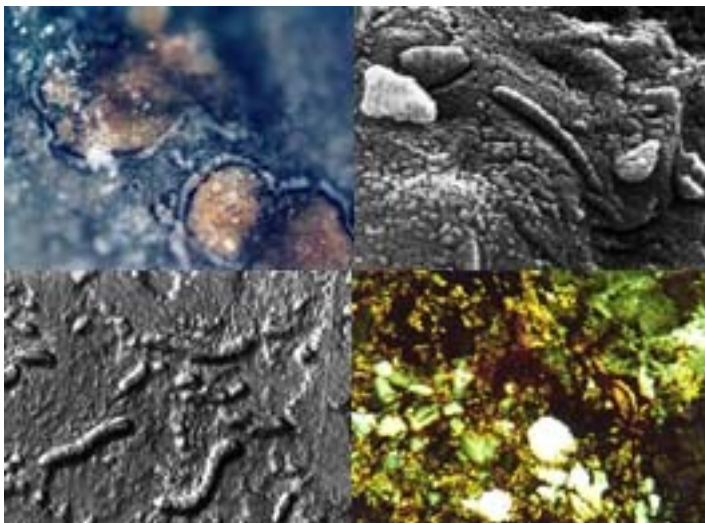
Origins of Life

Panspermia

<http://library.thinkquest.org/C003763/index.php?page=origin08>

summer of 1996 that scientists at NASA had discovered evidence for primitive Martian life on a meteorite from Mars. The meteorite, dubbed ALH84001, contained organic compounds, minerals typically of biological origin, and, most exciting of all, fossilized structures that resembled bacteria. There has been heated debate over whether or not the claims that the meteorite contains evidence for life are valid, and even today the matter has not been settled. Some scientists point out that while certain features of the meteorite were most likely produced by biological processes, the same features could also have non-biological origins.

For example, the carbonate globules on ALH84001 contained mineral crystals that are similar to those produced by bacteria on Earth.



These are pictures taken of ALH84001, a meteorite from Mars which contains evidence for primitive life on Mars. Courtesy NASA.

However, these minerals (which included magnetite, pyrrhorite and greigite) can also be produced by nonbiological processes on Earth. Despite the criticisms of some scientists, the

original researchers who made the discovery are adamant in their opinion that the evidence is strongly suggestive of ancient Martian life forms.

Following the announcement of the discovery of evidence for life on ALH84001 was a surge in support for the theory of panspermia. People began to speculate about the possibility of life having originated on Mars and then being transported to Earth on debris ejected off Mars after major impacts. But could life survive the intense doses of radiation, freezing temperatures and vacuum pressures that a transplanetary journey through space would involve?

Recent experiments prove that yes, certain life forms can tolerate these hazards. Bacteria are the most hardy form of life on Earth. By forming endospores, which are tough and resistant protective coverings, bacteria enter a dormant state and can survive through all manners of trauma such as a lack of nutrients and extreme temperatures. When the conditions are conducive for life, bacteria revive. During the Apollo 12 moon landing, astronauts recovered a lunar lander that had been sent to the moon years earlier. Upon examination back on Earth, scientists found bacteria on the lander that were still alive after years of exposure to the vacuum of the Moon's atmosphere! As Pete Conrad, one of the astronauts on the mission, put it so eloquently, "I always thought the most significant thing we found on the moon was that little bacteria who came back and lived and nobody ever said [anything] about it". The search for extreme life on Earth has revealed the existence of organisms that can survive a remarkable variety of hostile circumstances. Life, it seems, is tough.



Origins of Life

Panspermia

<http://library.thinkquest.org/C003763/index.php?page=origin08>



This is a picture from the movie Deep Impact, in which a comet crashed into Earth. Could comets carry the seeds of life? Courtesy Paramount.

The scientific evidence behind the theory of panspermia is mounting. Panspermia doesn't explain the origin of life itself, but the proliferation of life through the universe. While the idea that all life on Earth may actually have been seeded from other areas of the universe is regarded with some skepticism today, who knows? Someday we could find out that we are all Martians!